

REMARKS

Reconsideration of the application as amended is respectfully requested.

The Examiner's communication dated April 18, 2008 is acknowledged.

Claims 1 – 55 of the original application were pending. Of these, claims 33 – 55 were withdrawn from consideration under the earlier restriction requirement. Claims 1 – 32 stand rejected under 35 USC § 112. Claims 1 – 32 stand rejected for obviousness under 35 USC § 103.

By the present amendment, claims 4, 5, 11, 12, and 33 – 55 are cancelled (which includes all withdrawn non-elected claims), claims 1, 3, 6 – 8, and 10 are amended, and new claims 56 – 59 are added. After this amendment, claims 1 – 3, 6 – 10, 13 – 32, and 56 – 59 are pending. Specifically, claims 4, 5, 11, 12, and 33 – 55 are cancelled, and claims 3, 6 – 8, and 10 are amended to depend upon claim 1 as amended.

Basis for the amendments of claims 1, 6 – 8, and 10 is found at least in original claims 4, 5, 11, and 12 and in the original specification in paragraph 0023. Basis for the amendment of claim 3 is found at least in the original specification in paragraph 0022. Basis for the new claims is described below.

Rejections under 35 USC § 112 traversed

Claims 1 – 32 stand rejected under 35 USC § 112. Regarding 35 USC § 112 , first paragraph, the Examiner has stated that the scope of the claimed subject matter pertaining to the type of materials that may be used to functionalize the nanowire is not commensurate in scope to what is specifically enabled by the disclosure (Applicant's specification, paragraph 0023). Regarding 35 USC § 112 , second paragraph, the Examiner has stated that the claims omit essential elements.

Claim 1 is amended herein to more clearly state and distinctly claim what the applicant believes to be his invention. Claim 1 as amended recites (emphasis added):

"A fluid sensor for use in an environment having an ambient temperature, the fluid sensor comprising:

- a) a field-effect transistor (FET) comprising a functionalized semiconductor nano-wire, the functionalized semiconductor nano-wire *including at least one catalyst, the catalyst comprising a material capable of interacting with a fluid to be sensed and effecting a change of an electrical characteristic of the FET,*
- b) an integral heater disposed proximate to the field-effect transistor to heat the field-effect transistor to an elevated temperature relative to the ambient temperature, and
- c) integral thermal insulation disposed to maintain the field-effect transistor at the elevated temperature.

Thus, in claim 1 as amended and its dependent claims, the type of material used to functionalize the nanowire is specified as a catalyst capable of interacting with a fluid to be sensed and effecting a change of an electrical characteristic of the FET, as described *inter alia* in Applicant's specification, paragraph 0023. The language considered as unclear by the Examiner in claim 1 as previously amended on 01/04/2008 has now been deleted. Thus, claim 1 as currently amended and its dependent claims are believed to satisfy all the requirements of 35 USC § 112, first and second paragraphs. Therefore, withdrawal of the rejections of claims 1 – 32 under 35 USC § 112 is respectfully requested.

Rejections under 35 USC § 103 traversed

Claims 1 – 20 and 22 – 32 stand rejected under 35 USC § 103(a) as being unpatentable over Star et al. (U.S. Pat. Appl. 2004/013207 A1) in view of Chung (U.S. Pat. No. 5,576,563). These rejections are respectfully traversed.

Claim 1 as amended recites, in pertinent part (emphasis added):
"the functionalized semiconductor nano-wire including *at least one catalyst, the catalyst comprising a material capable of interacting with a fluid to be sensed and effecting a change of an electrical characteristic of the FET*" and

“c) integral *thermal insulation* disposed to maintain the field-effect transistor at the elevated temperature.”

Neither Star et al. nor Chung discloses a semiconductor nano-wire including at least one catalyst capable of interacting with a fluid to be sensed and effecting a change of an electrical characteristic of the FET. While Star et al. has a substrate including a *passivation layer 114* comprising silicon oxide covering the gate substrate, there is nothing in Star et al. to indicate that layer **114** acts as thermal insulation or that it is disposed to maintain a field-effect transistor at an elevated temperature. Since the passivation layer **114** of Star et al. is disposed between two parts of a field effect transistor device (viz., gate substrate **112** and carbon nanotubes **102**), it does not appear to be disposed to maintain the field-effect transistor at an elevated temperature as recited in Applicant's claim 1. A more reasonable correspondence may be made between passivation layer **114** of Star et al. with insulating layer **32** of Chung (Fig. 1), which *electrically* isolates heating layer **30** from gate electrode layer **20**, but does not *thermally* insulate heating layer **30** from gate electrode layer **20** because heating layer **30** is disposed to permit uniform *heating* of gate electrode layer **20** (Chung col. 2 lines 46 – 50).

Also, an *essential feature* of Chung's structure is gap **22**, through which a fluid can contact exposed gate surface **28** (Chung, FIG. 1, abstract, and col. 2 lines 20 – 30) and without which Chung's device cannot function as disclosed. Any combination of Chung's disclosure with Star et al., necessarily having that essential feature, would not correspond to Applicant's claim 1 as amended.

Thus, no combination of Star et al. with Chung as postulated by the Examiner makes the invention of Applicant's claim 1 as amended. Therefore, Applicant respectfully requests that the rejection of claims 1 – 20 and 22 – 32 under 35 USC § 103(a) be withdrawn and that those claims be allowed.

Claim 21 stands rejected under 35 USC § 103(a) as being unpatentable over Star et al. and Chung in view of the Trautweiler et al. article, "New Silicon-Based Metal-Oxide Chemical Sensors," Sensors Magazine, V16(9), Sept. 1999, p. 109 ff. This rejection is respectfully traversed.

The Examiner correctly states that neither Star et al. nor Chung teaches incorporation of a substrate configuration as claimed.

Claim 21 recites (emphasis added): "The fluid sensor of claim 13, wherein a portion of the substrate is *removed to form an opening under the field-effect transistor (FET)*, the opening being at least partially aligned with the field-effect transistor."

However, the article by Trautweiler et al. while showing a micromachined diaphragm (Fig. 1), does not describe an opening under a field-effect transistor (FET), the opening being at least partially aligned with a field-effect transistor. The correspondence postulated by the Examiner between Applicant's opening at least partially aligned with the FET and any "open or removed portion underneath the sensor" of Trautweiler et al. seems to be based on either speculation or impermissible hindsight, since Trautweiler et al. mentions neither any FET nor any alignment of an opening with a FET.

Furthermore, while the Examiner's citation of the Supreme Court in *KSR International vs. Teleflex Inc.* (KSR) that a "combination of familiar elements is likely to be obvious when it does no more than yield predictable results" may or may not be pertinent to the present case, KSR does not stand for the premise that every combination of familiar elements is obvious. In the present case of Applicant's claim 21, the Examiner has not shown that a particular claimed combination does no more than yield predictable results nor shown that a particular combination claimed is obvious.

Furthermore, dependent claim 21 inherits all the limitations of parent claim 1 as amended, which has been distinguished hereinabove from Star et al. and Chung. Applicant respectfully submits that Trautweiler et al. does not

cure the deficiencies of the Star et al. and Chung references singly or in combination. Thus, in summary, no combination of Star et al. and Chung with Trautweiler et al. would make Applicant's invention as claimed in claim 21.

Therefore, Applicant respectfully requests that the rejection of claim 21 under 35 USC § 103(a) be withdrawn and the claim allowed.

New claims

New claims 56 – 59 are presented. Basis for the subject matter of new claim 56 is found at least in Applicant's specification as filed at paragraph 35, in claims 1 and 42 as originally filed, and in paragraph 0019 of the application Ser. No. 10/423,063 incorporated by reference (see paragraph 0001 of the present application). Basis for the subject matter of new claim 57 is found at least in paragraph 0019 of the application Ser. No. 10/423,063 incorporated by reference. Basis for the subject matter of new claim 58 is found at least in paragraph 0080 and claim 31 of the application Ser. No. 10/423,063 incorporated by reference. Basis for the subject matter of new claim 59 is found at least in paragraph 0023 of the application Ser. No. 10/423,063 incorporated by reference.

This response is believed to be fully responsive to each issue raised in the office action, but if the Examiner maintains any rejection, applicant would appreciate a more detailed explanation of precisely where in the references the combination is suggested and the relevant limitations are disclosed.

Applicant expressly reserves the right to file divisional and/or continuation applications with any of the canceled or non-elected claims, or with similar claims, or with claims to any subject matter disclosed in the present application or incorporated by reference.

Applicant believes that the claims as amended are patentable over the prior art and respectfully requests that the rejections be withdrawn and the claims allowed.

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Respectfully submitted,

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